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THE UNITED STATES PATENT AND TRADEMARK OFFICE

INVENTOR(S): Brian D. Kernan, Emanuel M. Sachs, Samuel M. Allen
and Adam M. Lorenz

Serial No.: 10/723,989

Examiner:

Filing date: Nov. 26, 2003

Art Unit: 1742

Conf. No. 7978

For: INFILTRATING A POWDER METAL SKELETON BY A SIMILAR ALLOY
WITH DEPRESSED MELTING POINT EXPLOITING A PERSISTENT LIQUID
PHASE AT EQUILIBRIUM, SUITABLE FOR FABRICATING STEEL PARTS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

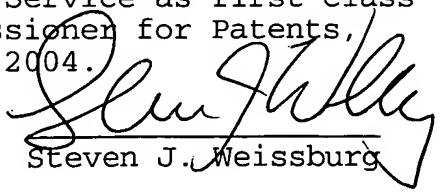
Sir:

INFORMATION DISCLOSURE STATEMENT

The references on attached Form PTO/SB/08A+B which relate
to the subject matter of the present invention are being brought
to the attention of the Patent and Trademark Office pursuant to
37 CFR 1.56 and 1.98.

CERTIFICATE OF MAILING UNDER 37 CFR §1.8(a)

I hereby certify that this correspondence is being
deposited with the United States Postal Service as first class
mail in an envelope addressed to: Commissioner for Patents,
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Steven J. Weissburg

U.S. Patent No. 3,652,261, issued March 28, 1972, on an application filed June 25, 1969, to Pierre W. Taubenblat, entitled IRON POWDER INFILTRANT.

U.S. Patent No. 4,286,987, issued Sept. 1, 1981, on an application filed Nov. 28, 1979, to Paul E. Matthews, entitled COMPOSITION FOR IRON POWDER COMPACT INFILTRANT.

U.S. Patent No. 4,327,156, issued April 27, 1982, on an application filed May 12, 1980, to Kenneth R. Dillon et al., entitled INFILTRATED POWDERED METAL COMPOSITE ARTICLE.

U.S. Patent No. 4,455,354, issued June 19, 1984, on an application filed Nov. 14, 1980, to Kenneth R. Dillon et al., entitled DIMENSIONALLY-CONTROLLED COBALT-CONTAINING PRECISION MOLDED METAL ARTICLE.

U.S. Patent No. 4,478,638, issued October 23, 1984 to Murray S. Smith, Jr. et al., on an application filed September 28, 1993.

U.S. Patent No. 4,710,273, issued Dec. 1, 1987, on an application filed Aug. 8, 1985, to Ted T. Okamoto, entitled OLEFIN PURIFICATION PROCESS.

U.S. Patent No. 4,964,908, issued Oct. 23, 1990 to Geoffrey Greetham, on an application based on PCT/GB87/00830, filed Nov. 20, 1987, having a §371 and §102(e) date of July 21, 1989.

U.S. Patent No. 4,971,755, issued November 20, 1990 to Masaki Kawano et al., on an application filed June 20, 1989.

U.S. Patent No. 5,204,055, issued on April 20, 1993, in the name of Sachs et al., entitled THREE-DIMENSIONAL PRINTING

TECHNIQUES, based on Application No. 07/447,677, filed on December 8, 1989.

U.S. Patent No. 5,236,032, issued August 17, 1993 to Tetsuya Nukami et al., on a chain of applications, the first of which was filed June 28, 1990.

U.S. Patent No. 5,509,555, issued April 23, 1996 to Yet-Ming Chiang et al., on an application filed June 3, 1994.

U.S. Patent No. 5,745,834, issued April 28, 1998 to Clifford C. Bampton et al., on an application filed September 19, 1995.

U.S. Patent No. 5,791,397, issued August 11, 1998 to Masayoshi Suzuoki et al. on an application filed March 12, 1996.

U.S. Patent App. 5,848,349, issued Dec. 8, 1998, on PCT App. No. PCT/US93/06065, with a § 371 and § 102(e) date of Feb. 3, 1995, to Newkirk et al., entitled METHOD OF MODIFYING THE PROPERTIES OF A METAL MATRIX COMPOSITE BODY.

U.S. Pat. No. 6,508,980 B1, issued Jan. 21, 2003, based on U.S.S.N. 09/509,284, with a §371(c)(1)(2)(4) date of July 7, 2000, in the name of Sachs et al., entitled METAL AND CERAMIC CONTAINING PARTS PRODUCED FROM POWDER USING BINDERS DERIVED FROM SALT.

U.S. Patent No. 6,719,948 B2, issued April 13, 2004, in the name of Lorenz et al., entitled TECHNIQUES FOR INFILTRATION OF A POWDER METAL SKELETON BY A SIMILAR ALLOY WITH MELTING POINT DEPRESSED, based on App. No. 09/863,073, filed May 21, 2001, published as US 2003/0156963 A1 on Aug. 21, 2003.

Published PCT application WO 02/094484 A1, international publication date November 28, 2002, for Int. App. No. PCT/US02/15635, Int. Filing Date May 17, 2002, is the PCT application that corresponds to U.S. Patent No. 6,719,948 B2 listed directly above. Only the cover page is enclosed because the balance is substantively identical to that patent.

Published PCT application, International Publication No. WO 01/90427 A1, International Publication Date November 29, 2001, for Int. App. No. PCT/US01/16427, Int. Filing Date May 21, 2001.

A § 351 U.S. counterpart is on file as U.S.S.N. 10/276,457, §371(c) date May 19, 2003, published as US-2004-0009086-A1, on January 15, 2004. The Examiner's attention is brought thereto. No copy of the U.S. Publication is enclosed, because it is substantially identical to the PCT publication that is mentioned immediately above, and which was published earlier.

Banerjee, S., Oberacker, R., and Goetzel, C., "Experimental Study of Capillary Force Induced Infiltration of Compacted Iron Powders with Cast Iron," *Modern Developments in Powder Metallurgy*, Vol. 16, Metal Powder Industries Federation: Princeton, NJ. pp. 209-244, 1984.

Carman, C., "Flow of gases through porous media," Butterworths: London, pp. 8-13, 1956.

GOETZEL, Claus G., "Infiltration," ASM Handbook, Vol. 7, Powder Metallurgy, pp. 551-566, 1984.

LANGFORD, George, "High Speed Steel made by Liquid Infiltration," Materials Science and Engineering, 28, pp. 275-284, 1977.

LANGFORD, George and CUNNINGHAM, Robert E., "Steel Casting by Diffusion Solidification", *Metallurgical Transactions B*, Volume 9B, pp. 5-19, March 1978.

Lorenz, A., "Transient Liquid-Phase Infiltration of Powder-Metal Skeleton," submitted to the Massachusetts Institute of Technology, Department of Mechanical Engineering, in June of 2002, cataloged on March 13, 2003, pp. 1, 2, 4, 5, 92-101, 113, 114.

Lorenz, A., Sachs, E., Allen, S., Rafflenbeul, L. and Kernan, B., "Densification of a Powder-Metal Skeleton by Transient Liquid-Phase Infiltration," *Metallurgical and Materials Transactions A*, Vol. 35A, pp. 631-640, Feb. 2004.

Lorenz, A., Sachs, E. and Allen, S., "Freeze-Off Limits in Transient Liquid Phase Infiltration," *Metallurgical and Materials Transactions A*, Vol. 35A, pp. 641-653, Feb. 2004.

Messner, R. and Chiang, Y., "Liquid-Phase Reaction-Bonding of Silicon Carbide Using Alloyed Silicon-Molybdenum Melts," *Journal of the American Ceramic Society*, Vol. 73, No. 5, pp. 1193-1200, 1990.

Scherer, G., "Theory of Drying," *Journal of the American Ceramic Society*, Vol. 73, No. 1, pp. 3-14, 1990.

Sercombe, T., Loretto M., and Wu, X., "The Production of Improved Rapid Tooling Materials," *Advances in Powder Metallurgy and Particulate Materials*, pp. 3-25 to 3-36, Proceedings of the 2000 International Conference of Powder Metallurgy and Particulate Materials, May 30-June 3, 2000. Metal Powder Industries Federation: Princeton, NJ.

Tanzilli, R. and Heckel, R., "Numerical Solutions to the Finite, Diffusion-Controlled, Two-Phase, Moving-Interface Problem (with Planar, Cylindrical, and Spherical Interfaces)," *Transactions of the Metallurgical Society of AIME*, Vol. 242, pp. 2313-2321, November 1968.

Thorsen, K., Hansen, S., and Kjaergaard, O., "Infiltration of Sintered Steel with a Near-Eutectic Fe-C-P Alloy," *Powder Metallurgy International*, Vol 15, No. 2, pp. 91-93, 1983.

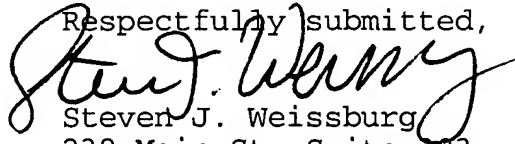
Zhuang, H., Chen, J., and Lugscheider, E., "Wide gap brazing of stainless steel with nickel-base brazing alloys," *Welding in the World*, Vol. 24, No. 9/10, pp. 200-208, 1986.

Zhuang, W. and Eagar, T., "Liquid infiltrated powder interlayer bonding: a process for large gap joining," *Science and Technology of Welding and Joining*, Vol. 5, No. 3, pp. 125-134, 2000.

Although this statement includes all the relevant information presently known to the applicants, it should not be interpreted as a representation that an exhaustive search has been conducted, or that no better information exists or that the items cited herein are admitted to be prior art. Moreover, Applicants invite the Examiner to make an independent evaluation of the cited information to determine its relevance to the subject matter of the present application. The citation of an item herein should not be considered to be an admission that the item is prior art. Some items are definitely not prior art themselves, but are cited herein for information only.

Applicants are of the opinion that the claims of the present application patentably distinguish over this information or any combination thereof.

Applicant(s) believe the enclosed Information Disclosure Statement is entitled to the benefit of 37 CFR §1.97(b)(1). Accordingly, applicant(s) believe that no fee or certification is required. If a fee is required, the Commissioner is hereby authorized to charge the fee to Deposit Order Account No. 19-2553. The Commissioner is also authorized to charge Account No. 19-2553 for any additional extension and/or fee that may be required.

Respectfully submitted,

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Cambridge, MA 02142
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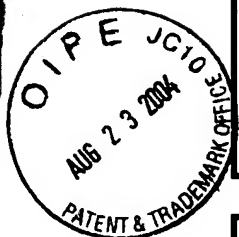
August 19, 2004

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INFORMATION DISCLOSURE STATEMENT BY APPLICANT <i>(use as many sheets as necessary)</i>				Complete if Known	
				Application Number	10/723,989
				Filing Date	11-26-2003
				First Named Inventor	Kernan
				Group Art Unit	1742
Examiner Name					
Sheet	1	of	5	Attorney Docket No.	MIT 10327 US

U.S. PATENT DOCUMENTS						
Examiner Initials	Cite No.	U.S. Patent Document		Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Pages, Columns, Lines where relevant passages or figures appear
		Number	Kind Code			
		3,652,261		Taubenblat	06-25-1969	
		4,286,987		Matthews	11-28-1979	
		4,327,156		Dillon et al.	05-12-1980	
		4,455,354		Dillon et al.	11-14-1980	
		4,478,638		M. S. Smith, Jr. et al.	10-23-1984	
		4,710,273		Okamoto	08-08-1985	
		4,964,908		Greetham et al.	10-23-1990	
		4,971,755		Kawano et al.	11-20-1990	
		5,204,055		Sachs et al.	04-20-1993	
		5,236,032		Nukami et al.	08-17-1993	
		5,509,555		Y. Chiang et al.	04-23-1996	
		5,745,834		C. Bampton et al.	04-28-1998	
		5,791,397		Suzuoki et al.	08-11-1998	
		5,848,349		Newkirk et al.	12-08-1998	
		6,508,980	B1	Sachs et al.	01-21-2003	
		6,719,948	B2	Lorenz et al.	04-13-2004	
		US-2004- 0009086	A1	Lorenz et al.	01-15-2004	

FOREIGN PATENT DOCUMENTS								
Examiner Initials	Cite No.	Foreign Patent Document			Name of Patentee or Applicant of Cited Document	Date of Publication of Cited Document MM-DD-YYYY	Pages, Columns, Lines where relevant passages or figures appear	T
		Office	Number	Kind Code				
		WO	01/90427	A1	MIT	11-29-2001		
		WO	02/094484	A1	MIT	11-28-2002		

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OTHER PRIOR ART - NON PATENT LITERATURE DOCUMENTS			
Examiner Initials	Cite No.	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, symposium, catalog, etc.), date, page(s), volume- issue number(s), publisher, city and/or country where published	T
		BANERJEE, S., OBERACKER, R., AND GOETZEL, C., "Experimental Study of Capillary Force Induced Infiltration of Compacted Iron Powders with Cast Iron," Modern Developments in Powder Metallurgy, Vol. 16, Metal Powder Industries Federation: Princeton, NJ, pp. 209-244, 1984.	
		CARMAN, C., Flow of gases through porous media. Butterworths: London, pp. 8-13, 1956.	
		GOETZEL, Claus G., "Infiltration," ASM Handbook, Vol. 7, Powder Metallurgy, pp. 551- 566, 1984.	
		LANGFORD, George, "High Speed Steel made by Liquid Infiltration," Materials Science and Engineering, 28, pp. 275-284, 1977.	
		LANGFORD, George and CUNNINGHAM, Robert E., "Steel Casting by Diffusion Solidification", Metallurgical Transactions B, Volume 9B, pp. 5-19, March 1978.	

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		MESSNER, R. AND CHIANG, Y., "Liquid-Phase Reaction-Bonding of Silicon Carbide Using Alloyed Silicon-Molybdenum Melts," Journal of the American Ceramic Society, Vol. 73, No. 5, pp. 1193-1200, 1990.	
		SCHERER, G., "Theory of Drying," Journal of the American Ceramic Society, Vol. 73, No. 1, pp. 3-14, 1990.	
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